

scientific direction of the farm acquired for the purpose of experiment and demonstration by the Northumberland County Council. The new calendar contains full information of all the courses of work arranged for the coming session. The Plymouth directory contains an excellent diagram showing in a graphic manner the arrangements made by the local education authority to coordinate the work in all Plymouth schools. The classes at the school of science and technology make it possible for any workman anxious to acquaint himself with the scientific principles of his calling to do so easily.

In order to facilitate the adoption by secondary schools of systematic courses in geography, the Board of Education has issued a circular indicating in outline the points to which the attention of inspectors will be directed when inspecting classes in this subject. Each school desiring the approval of the Board for its course in geography should be prepared to submit a course providing, first, an outline scheme dealing with the great land and water areas in such a way that on completing the course the pupils shall have gone through the geography of the world; and, secondly, a suitably graded series of exercises connected with the subjects included in the course. The Board lays it down that the aim of the teaching should be to produce a vivid impression of connected facts through considerations, such as those of cause and effect, and the practical bearings of the facts selected. Referring to the exercises, the circular states that these may consist of (a) questions and answers designed to elicit, through causes and consequences, subject-matter for entry in the pupils' note-books; (b) notes and diagrams which should include worked-out problems together with original maps and plans; (c) mapping; and (d) field work, excursions, factory visits, &c. Suggestions for a four-year course in geography, together with an outline plan for preliminary instruction, are also given. The work suggested for the preliminary instruction as suitable for children from eight to twelve, and the statement of what these pupils should be expected to know before entering upon the four-years' course, presume a standard of attainment which the Board can scarcely expect to be realised at present. The knowledge of physiography, for instance, to be expected of these young people would be a credit to students several years older. As so few teachers of geography understand what is meant by the scientific study of their subject, it would have been an advantage if the instructions as to the practical work to be done could have been made more explicit. The circular refers to "worked-out problems," but it might with advantage have included a few typical examples of the problems required. The real difficulty will be to find teachers capable of acting in the spirit of the suggestions made by the Board; but it is something for them to have a method indicated which not only is sound in principle, but is being put into practice here and there. The circular is a decided step in advance, and brings nearer the time when scientific instruction in geography will be general in schools of all grades.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 8.—"The Pharmacology of Indaconitine and Bikhacconitine." By Dr. J. Theodore **Cash**, F.R.S., and Prof. Wyndham R. **Dunstan**, F.R.S.

The present paper deals with the physiological action of two new "aconitines," which have been isolated at the Imperial Institute from two varieties of Indian aconite. One is an alkaloid, which has been named indaconitine. It was found in the roots of the Indian aconite, called by Brühl *Aconitum napellus*, var. *hians*, since identified by Staph as a new species which has received the name of *Aconitum chasmantium*. The other alkaloid has been named "bikhacconitine," being derived from one of the highly poisonous forms of aconite known in India under the vernacular name of "Bikh." This aconite was named by Brühl *Aconitum ferox*, var. *spicatum*, but has been renamed *Aconitum spicatum* by Staph, who regards it as a distinct species.

Results of experiments with these two substances are summarised as follows:—

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The two aconitines, indaconitine and bikhacconitine, agree in their qualitative effects with the other alkaloids of this series, aconitine, japaconitine, and pseudaconitine, which have been dealt with in our previous papers.

The toxicity of indaconitine is less than that of bikhacconitine towards warm-blooded animals; in this respect the former stands very near to the aconitine of *A. napellus*, whilst the latter, being somewhat stronger than japaconitine, is to be referred to a position between this alkaloid and pseudaconitine from forms of *A. ferox*, which is much the most active of the series.

The depression of the respiratory function by indaconitine is less than that produced by bikhacconitine, and to this the greater toxicity of the latter is referable. Repeated doses of alkaloids administered at regular intervals and in similar fractional proportions of the lethal dose are followed by a more marked toxic effect when bikhacconitine is administered rather than indaconitine. Towards frogs the toxicity of the two alkaloids under discussion is practically equal; bikhacconitine is more active than indaconitine in reducing the respiratory activity. On the other hand, it is somewhat less active in abolishing the excitability of muscular and intramuscular motor nervous tissue (immersion experiments), and in reducing the ability of the muscle-nerve preparation poisoned *in situ* for the performance of work sufficient to cause fatigue. The local effect of the two aconitines when applied to the skin by inunction is equal and similar to that of the aconitines already considered.

Indaconitine and bikhacconitine may therefore be substituted for aconitine and pseudaconitine for internal use, indaconitine being administrable in the same dose as aconitine (from *A. napellus*) and bikhacconitine in proportion of 0.75 of the unit dose of the former, whilst for local application they may be used as constituents of ointments in similar proportions to aconitine.

Pseudaconine from Pseudaconitine and Bikhacconitine.

The action of these is, towards frogs, identical. Their toxicity appears to be practically equal and their effect generally similar to that of aconine (from aconitine). Their action is in the main curari-like in character.

"On the Physiological Activity of Substances Indirectly Related to Adrenalin." By H. D. **Dakin**. Communicated by Prof. E. H. Starling, F.R.S.

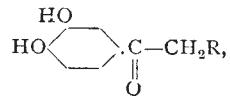
The following deductions are made provisionally, until further experimental evidence is available:—

(1) It appears that the catechol nucleus is essential for the production of physiologically active substances of the type of adrenalin.

(2) It is of importance that the hydrogen atoms of both hydroxyl groups in the catechol nucleus be unsubstituted.

(3) An alkyl group of low molecular weight (e.g. methyl, ethyl) attached to the nitrogen tends to produce a much more active substance than when an aromatic group is attached, whilst derivatives of piperidine, heptylamine, and benzylamine occupy an intermediate position.

(4) The reduction of ketonic bases of the type



where R is a simple aliphatic group, results in the production of bases with enormously increased physiological activity.

(5) In the substances examined there appears to be a connection between chemical instability and physiological activity, and *vice versa*.

July 8.—"An Experimental Inquiry into the Nature of the Substance in Serum which influences Phagocytosis." By Dr. George **Dean**. Communicated by Prof. J. Rose Bradford, F.R.S.

The author's conclusions are as follows:—

(1) As has been shown by a number of workers, e.g. Denys, Metchnikoff, Savtschenko, Levaditi and others, there is produced in the blood serum of animals actively immunised by bacterial injections a specific immune substance which has among its properties that of preparing the microbe for phagocytosis.

(2) This immune substance is thermostable, resisting a temperature of 60° C. for several hours.

(3) In normal serum there is present a substance having a similar action and which also resists a temperature of 60° C. for hours, and may persist in the serum of the horse for years.

(4) The experiments recorded in this paper tend to confirm the idea that the substances are identical, i.e. that in normal serum there is present a small amount of the immune substance having the property of preparing the microbes for phagocytosis.

(5) Coccii fully occupied by the substance from heated immune serum when passed through fresh normal serum do not remove the substance from normal serum, whereas fresh coccii remove a large part of it.

(6) The converse of the above is also true, viz. that coccii fully occupied by the substance from normal serum do not remove the substance from immune serum, whereas fresh coccii do.

(7) The thermostable substance in normal serum is no doubt identical with the "fixateur" or "substance sensibilisatrice" of the French school and with Wright and Douglas's "opsonin".

Seeing that the terms "fixateur" and "substance sensibilisatrice" which have been employed by Metchnikoff's school to include the property of preparing the microbes for phagocytosis are used to designate a number of other properties of immune serum, it may be convenient to adopt Wright and Douglas's term of "opsonin" for the particular property in question. The only danger attached to such a course is that one might be led to regard the "opsonin" as actually a different substance, and not merely a property of immune serum.

PARIS.

Academy of Sciences, September 18.—M. Troost in the chair.—Preliminary note on the total eclipse of the sun of August 30 at Burgos: H. Deslandres. Details are given of the instruments set up and the observations attempted. Owing to clouds, the second and third contacts could not be observed. The corona was seen for a minute about the middle of totality. M. Fabry succeeded in making a photometric measurement of the total light of the corona, and an observation of the brightness of one of its points. M. Bernard also was successful in some photometric observations, and M. d'Azambuja in measurements of the heat spectrum of the corona. Details of the work will be published later.—Observation of the eclipse of August 30: H. Andoyer. The apparatus was installed at El-Arrouch, 32 kilometres from Philippeville, and the weather was very favourable. The object was to obtain as many direct photographs as possible. Forty-four were obtained, eleven during totality.—Observation of the solar eclipse of August 30 at Athens: D. Eginitis. The observations were made under good atmospheric conditions.—On the isolation of terbium: G. Urbain. In a preceding communication the author has described the separation of a rare earth characterised by a single absorption band $\lambda=488$, corresponding to an element named Z₈ by M. Lecoq de Boisbaudran. This has been submitted to a long series of further fractionations, first as a double nitrate with nickel, and afterwards by precipitation with ammonia. The final product was 7 grams of an earth apparently homogeneous, for which the author proposes to reserve the name of terbium. The principal bands in the absorption spectrum are given, and the atomic weight, 159.2 (O=16).

NEW SOUTH WALES.

Linnean Society, July 26.—Mr. T. Steel, president, in the chair.—On dimorphism in the female of *Ischnura heterosticta*, Burm. (Neuroptera: Odonata): R. J. Tillyard. In February last, at Cook's River, about a dozen beautifully coloured examples of the pretty little dragon-fly, *Ischnura heterosticta*, Burm., which appeared to be males, were captured, together with half-a-dozen females of the ordinary dull blackish type. On examination it was found that, with the exception of three, all the supposed males were in reality a second form of female (form B) closely resembling the male. It is intermediate in shape between the male

and the typical female (form A), the abdomen being thicker than in the male, but with the tip distinctly enlarged; while in colouring it almost exactly resembles the male, but bears not the slightest resemblance to the typical female. Both forms, however, possess the pale pterostigma on the forewing, whereas in the male this is black.—Notes on the older Tertiary foraminiferal rocks on the west coast of Santo, New Hebrides: F. Chapman. The examination of the oldest sedimentary rocks seen and collected by Mr. Mawson in the Island of Santo proves them to be of Miocene age (Aquitanian and Burdigalian). A point of particular interest brought out by the present investigations is the association of Lepidocyclina with the excentric forms of Miogypsina in the New Hebrides. From this it appears that faunas, distinct in the European area, were living together in the New Hebrides Miocene sea. A similar association of species occurs here as in the Miocene limestones of Christmas Island, and also of Madura, and other parts of the Dutch East Indies, with which the New Hebrides marine area was most probably connected when these fossiliferous beach and shallow-water deposits were laid down.—On the occurrence of a bed of fossiliferous tuff and lavas between the Silurian and Middle Devonian at Cavan, Yass, N.S.W., similar in age and character to the Snowy River porphyries of Victoria: A. J. Shearsby.—The rôle of agglutination in immunity: R. Greig Smith. The research has shown that (1) normal typhoid bacteria are incapable of being absorbed by the leucocytes when these have been freed from adhering serum; (2) typhoid bacteria, when treated with active agglutinating serum which has been heated to destroy the opsonins, are agglutinated and are then englobed by the leucocytes; (3) typhoid bacteria which have been grown in agglutinating serum, heated or not heated, are also absorbed; (4) while active agglutinating serum prepares the microbes for ingestion by the phagocytes, the so-called chemical agglutinating substances do not possess this property; and (5) the rôle of agglutinin is, therefore, to coat the bacteria with a precipitate which is positively chemotactic towards the leucocytes; and thus, by facilitating the absorption of the microbes, agglutination plays an active part in immunity.

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